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PRIMARY NONADHERENCE TO CHOLESTEROL MEDICATIONS AND ASSOCIATED HEALTH CARE OUTCOMES

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OBJECTIVES: To evaluate primary nonadherence [PNA] to cholesterol medications and compare health care outcomes between primary adherent and nonadherent patients. **METHODS:** This retrospective cohort study identified all patients who were treatment-naïve to antihyperlipidemics patients with at least one new cholesterol prescription written during the period of December 1, 2009 to February 28, 2010. PNA was defined as the failure to fill a prescription within 90 days of when it was written [index date]. Patients were followed for 18 months after the index date for healthcare outcomes of low-density lipoprotein [LDL] values, cardiac/stroke events, ER visits and all-cause or cardiac/stroke-related hospitalizations. Descriptive statistics were used to compare baseline characteristics and health care outcomes between primary adherent and nonadherent patients. Cox proportional hazard models were used to estimate the hazard ratio [HR] as a measure of the relative risk of each event in the primary nonadherent in comparison to the primary adherent after controlling for patient and physician characteristics. Patients were censored at the end of the follow-up period. **RESULTS:** A total 17,400 patients were identified during the study period and 15% were primary nonadherent. At baseline, primary nonadherent patients were sicker than primary adherent patients with significantly higher Charlson comorbidity index values, prescription use, ER visits and hospitalizations in the prior year. LDL values decreased after the index date for both groups, but primary adherent patients had a significantly greater decrease in LDL values on average [-37.2 vs. -14.9 ($p<0.0001$)]. After adjusting for baseline covariates, the resulting HR (95%CI) was 0.83 (0.69, 0.99) for cardiac/stroke events, 0.99 (0.91, 1.09) for ER visits, 0.87 (0.77, 0.99) for all-cause hospitalization, and 0.72 (0.44, 1.12) for CV-related hospitalization. **CONCLUSIONS:** Primary nonadherent patients experienced smaller decreases in LDL values, but were not found to be at increased risk for cardiac/stroke events, ER visits or hospitalization during the follow-up period.

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CHRONIC MEDICATION ADHERENCE: ITS ASSOCIATION WITH HEALTH CARE COSTS

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OBJECTIVES: Treatment for high-prevalence chronic diseases requires medication adherence. Improved adherence increases medication utilization, leading to higher pharmacy costs. Higher adherence, however, may reduce medical services use resulting in a decrease in overall healthcare costs despite the increase in pharmacy costs. This study examined the impact of chronic medication adherence on healthcare costs. **METHODS:** The study samples were three independent cohorts of individuals with the separate conditions of diabetes, hypertension and hypercholesterolemia, identified from a commercially insured health plan using integrated medical and pharmacy claims data between January 1, 2007 and December 31, 2009. Claims information of each individual was assessed for 12 months from index date (the first outpatient visit or hospitalization discharge date during 2008). Adherence was measured using Proportion of Days Covered (PDC) as endorsed by Pharmacy Quality Assurance (PQA). Healthcare costs (pharmacy, medical and total costs) were measured at two levels: all-cause and condition-specific. A generalized linear model with a gamma log link controlling for covariates was used to fit six statistical models for each cohort. **RESULTS:** There were 22,012, 64,600, and 59,003 individuals in the diabetes, hypertension and hypercholesterolemia cohorts respectively. At the all-cause level, increased PDC was significantly associated with decreased medical costs across the three cohorts ($p<0.05$). At the condition-specific level, increased PDC was significantly associated with decreased medical costs in the hypertension and hypercholesterolemia cohorts ($p<0.001$), but with increased medical cost in the diabetes cohort ($p<0.001$). Due to the large increase in pharmacy costs associated with higher PDC ($p<0.001$), total healthcare costs were increased ($p<0.001$) both at all-cause and condition-specific levels in each cohort. **CONCLUSIONS:** As adherence increases, the resulting savings in medical costs are not able to offset the increase in pharmacy costs. Therefore, measures that aim to lower pharmacy cost while preserving or improving adherence are needed.

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IMPACT OF CALENDAR BLISTER PACKAGING (CBP) ON ADHERENCE WITH ANTIHYPERTENSIVE MEDICATIONS IN OLDER ADULTS TREATED FOR DEMENTIA

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OBJECTIVES: The risk of medication non-adherence to prescribed antihypertensive medications in older adults is high in part due to forgetfulness, cognitive deficits and difficulties with opening the traditional vial packaging. The objective of this study was to assess the effect of innovative calendar blister packaging technology incorporating a day or date feature on adherence with antihypertensive medications in older adults aged 65 and above treated for dementia. **METHODS:** Pharmacy dispensing data (12/2006 - 7/2009) from a large US mass merchandiser were analyzed. This retrospective cohort study included older adults who filled prescription for oral lisinopril or enalapril at a study pharmacy during 1 year before (baseline period) and after the switch of lisinopril packaging from vials to CBP (follow-up period) and also filled a prescription for dementia medications during the study period. Cohorts were stratified into new users (no dispense date for ACE inhibitors (ACEI) or similar drugs during the 360 days before baseline index fill) and prevalent users (≥ 1 dispense date for lisinopril or enalapril during the 360 days before baseline index fill). Medication possession ratio (MPR) was used to calculate adherence. **RESULTS:** A total of 26,508 patients were eligible for the study with 44.6% having a Medicare insurance type plan. The sample comprised of 18,580 lisinopril users (CBP) and 7928 enalapril users (vial); 7523 were new ACEI users (28.4%) and 18,985 prevalent ACEI users (71.6%). After adjusting for age, gender, US census region, average daily pill burden, median household income, payer type, and prescribing physician specialty. CBP use in new and prevalent medication users was associated with 10% higher MPR rate as compared vial use. **CONCLUSIONS:** Preliminary analysis showed that there was a difference in MPR in between older adults aged 65 and above treated for dementia who received antihypertensive medication in CBP as compared to vial packaging.

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THE RELATIONSHIP BETWEEN HOSPITAL READMISSION AND POST-DISCHARGE MEDICATION ADHERENCE

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OBJECTIVES: Reducing hospital readmission helps contain healthcare cost and improve quality. The objective of this research is to explore the relationship between post-discharge medication adherence and hospital readmission. **METHODS:** A cohort study design was used to compare medication adherence rates among patients discharged from the hospital following a COPD (Chronic Obstructive Pulmonary Disease) or CHF (Congestive Heart Failure) related hospitalization. Data from MarketScan® Commercial Claims and Encounters dataset (Thomson Reuters, New York, NY) for the period of January 1, 2008 to December 31, 2009 was used. Inclusion criteria required that the patient be: (a) under age 64 (b) continuously enrolled over the pre and post 180 days of first (index) admission; (c) had a hospital admission during the first 6 months of 2009 for CHF (ICD9=428xx or 40211, N=12,260) or for COPD (ICD9 =490xx, 491xx, 492xx, 494xx, 496xx, N=149,411). Readmission defined as being readmitted within 30 days of discharge. The exposure of interest was a disease-related prescription claim following hospital discharge. The primary outcome measured as a binary variable indicating hospital readmission within 30 days of initial discharge. Multivariate logistic regression analysis was conducted controlling for previous hospital days (same disease), previous physician visits (same disease), co-morbidity, age, and gender. **RESULTS:** Patients lacking post-discharge medication claims had higher rate of readmission ($p<0.01$ for both disease). The differences were 17% (20% vs. 3%) for CHF and 3% (6% vs. 3%) for COPD patients. When controlling for confounders, CHF patients without claim were 8 times more likely to be re-admitted ($p<0.01$) than those with one. COPD patients showed similar effect with smaller effect size (Odds Ratio =3.8, $p<0.01$). **CONCLUSIONS:** Patients without post-discharge medication claims are more likely to be readmitted. To improve the quality of inpatient care, efforts should be made to ensure patients adhere to medication regimes following hospital discharge.

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A DYNAMIC PANEL MODEL TO ESTIMATE THE EFFECT OF MEDICATION ADHERENCE ON CLINICAL OUTCOMES IN PATIENTS WITH TYPE II DIABETES AND COMORBID HYPERTENSION

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OBJECTIVES: Dynamic Panel Models (DPMs) capture time-varying adherence effect as well as control for state-dependence and unobserved biases. We applied DPMs to estimate the direct impact of adherence to diabetes medications on HbA1C and adherence to hypertension medications on systolic blood pressures (SBP) and diastolic blood pressures (DBP) for patients who have both type II diabetes and comorbid hypertension. **METHODS:** A retrospective cohort study for patients newly starting oral diabetes or hypertension medication therapy between July 2006 and June 2007 with the pre-existing comorbid hypertension or diabetes prescription history was conducted using administrative claims from a large physician group in Southern California (N=4633). Time-varying medication adherence, covariates (prior outcomes, experience in hypoglycemia, experience in hospitalization, occurrence of micro- or macro-complications) and outcomes were measured every 6 months over 33 months of follow-up period. Available lag dependent and independent variables were used as instrumental variables. Parameter estimates were compared using fixed effects (FE), random effects (RE), and DPMs. The validity of the model specification was tested through 2nd order autocorrelation test and Sargan test of overidentifying restrictions. **RESULTS:** Applying DPMs, medication adherence, prior outcomes, and age showed significant impact on clinical outcomes. We found a 10 percentage point increase in adherence was associated with a 0.05 percentage point decrease ($p=0.04$) in HbA1C, a 0.62 mmHg decrease ($p=0.02$) in SBP, and a 0.47 mmHg decrease in DBP ($p=0.002$) applying DPMs. Using the FE or RE models, the adherence impact became smaller. A 10 percentage point increase in adherence was associated with a 0.04 percentage point decrease ($p<0.001$) in HbA1C, a 0.22 mmHg decrease ($p<0.001$) in SBP, and a 0.13 mmHg decrease ($p<0.001$) in DBP applying the FE model. **CONCLUSIONS:** DPMs estimated higher adherence to diabetes or hypertension medications improved clinical outcomes, and the estimated impact was greater than the results from conventional models.